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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,782	12/11/2003	Michael M. Cox	960296.99501	9577

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EXAMINER	
BURKHART, MICHAEL D	

ART UNIT	PAPER NUMBER
1633	

DATE MAILED: 03/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,782	COX ET AL.	
	Examiner	Art Unit	
	Michael D. Burkhart	1633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *2/2/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) *3, 14, and 29-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-12,22,23 and 33-35* is/are rejected.

7)☒ Claim(s) *13,15-21 and 24-28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/14/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I, claims 1, 2, 4-13, 15-28, and 33-36 in the reply filed on 2/2/2006 is acknowledged. The traversal is on the ground(s) that: 1) the subject matter of Groups I-III are inextricably linked because all of the compositions and methods employ a modified RecA gene; 2) a search of one Group would inevitably lead to overlap with the other Groups, and thus the search is not burdensome; 3) restriction is optional, and that the Examiner must examine claims directed to independent and distinct inventions if the search and examination can be made without serious burden; and 4) fees due in filing divisional applications present an undue burden on applicants, thus all claims should be examined together. This is not found persuasive because, as outlined in the Restriction Requirement, the compounds claimed in Group I and II, and the compounds of Group II and the methods of Group III, are unrelated rather than "inextricably linked". The only Groups with a relationship are Groups I and III, and grounds for restriction based on alternative use(s) for the compounds of Group I were clearly presented in the Restriction Requirement. Applicants are silent in regards to why these are not proper grounds for restriction. Regarding 2) and 3), the Groups are all classified into different class and subclass, which is enough to establish search burden. Furthermore, examination of DNA and protein claims together requires separate searches and represents an undue burden due to the complex and repetitive nature of the search and corresponding examination of more than one of the claimed sequences. This undue burden is caused by the continued exponential increase in size of the sequence databases to be searched for each sequence, resulting in a corresponding increase in computer search time and examiner time for reviewing the computer

search results. Regarding 4), any monetary burden on the applicant(s) is not a consideration for proper restriction of distinct inventions.

The requirement is still deemed proper and is therefore made FINAL.

Claims 3, 14, and 29-32 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 2/2/2006.

Sequence Rules

Figures 11-15 contain sequences not identified by a SEQ ID number in the figures or in the Brief Description of the Drawings. These details are requirements of the Sequence Rules (MPEP 2400 §1.821-1.825) and must be corrected. Any response which does not include compliance with the Sequence Rules will be considered non-responsive.

Double Patenting

Applicant is advised that should claim 22 be found allowable, claim 23 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). A pH range of from 7.5 - 9.5 (i.e. claim 22) is the same as pH 8.5(+/- 1.0) (claim 23).

Applicant is advised that should claim 27 be found allowable, claim 28 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an

application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). The only extended reactions disclosed are four- and three-strand reactions, thus claim 27 embraces three and four strand reactions. By claiming "at least three-strand reactions", claim 28 also embraces three- and four-strand reactions.

Claim Objections

Claims 1 and 9 are objected to because of the following informalities: in claims 1 and 9, line 2 "acids" should be "acid". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4-12, and 33-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the limitation "the DNA binding protein" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claims 1 and 9 recite a mutant RecA protein "comprising a deletion of at least 13-20 (or 13-25 in claim 9) amino acids residues from the carboxyl terminus." The claim embraces any deletion from the C-terminal amino acid to the N-terminal alanine (or methyl in the protein precursor). Because the claim encompasses such large deletions, it is unclear when the deletion

mutant is no longer a RecA protein, that is when the functions of RecA will no longer be present as larger and larger portions of the protein are removed. Furthermore, there is no specific definition of where within the protein the carboxyl terminus begins (it is clear it ends with the final residue). It is unclear if only the final residues are removed (as in a truncation) or if the invention encompasses internal deletions from the carboxyl terminus. Therefore, the metes and bounds of the claimed subject matter are unclear.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 6-8 and 22-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants claim a mutant RecA protein with at least a 13-20 residue deletion in the carboxyl terminus that enhances binding to DNA during a strand exchange reaction, relative to wild-type RecA. Applicants disclose only a double mutant RecA protein (ΔC17/E38K) with this property. Applicants also claim the ΔC17/E38K mutant protein that induces complete product formation in a strand exchange reaction over a range of pH values. The claims read on a broad genus of mutant RecA proteins that enhance binding to DNA during a strand exchange reaction, and completion of the reaction, relative to wild-type RecA.

The written description requirement for a genus may be satisfied by sufficient description of a representative number of species by actual reduction to practice or by disclosure of relevant identifying characteristics, i.e. structure or other physical and/or chemical properties, by functional characteristics coupled with a known or disclosed correlation between structure and function, or by a combination of such identifying characteristics, sufficient to show that applicant was in possession of the claimed invention. In the instant case, applicants only disclose the ΔC17/E38K RecA mutant as having the enhancement of strand exchange function, and that this mutant induces "complete" strand exchange at pH 8.3 and 8.8, but not at 8.0 or 9.3 (see Figs. 8 and 9). Neither applicants nor the prior art disclose any other mutant RecA proteins, as claimed, capable of the claimed functions. Rather, Lubetti et al (J. Biol. Chem., 2003, pp. 16372-16380, cited in the IDS) establish that deletion of from 13-25 residues in the carboxyl terminus of *E. Coli* RecA reduces the function of the proteins in a DNA strand exchange reaction (Fig. 7, page 16379). This expands the same results for a Δ25 mutant studied by Tateishi et al (RecA5327, see 102(b) rejection below), who established a Δ25 mutant to perform poorly in a three-strand exchange reaction relative to wild-type (Fig. 13, page 127). Applicants claim the RecA deletion mutants by function only, without a correlation between structure and function. Applicants provide no disclosure of what domains or residues may be further altered wherein the mutant RecA has the requisite function. Given the diversity of mutant RecA proteins claimed, and the failure of mutants embraced by the claims to provide the claimed function, it is considered that the instant disclosure does not describe enough functional species in order to be commensurate with the claimed genus. The diversity of the mutant RecA proteins involved and lack of disclosure regarding mutants that have the claimed function, would require the skilled artisan to

conclude that the example presented by the applicants are not sufficient to describe the claimed genus.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Tateishi et al (J. Mol. Biol., 1992, cited in the IDS).

Tateishi et al disclose an *E. Coli* RecA mutant termed (RecA5327) with the C-terminal 25 amino acid residues deleted (see abstract). The RecA5327 mutant could remove LexA from dsDNA at lower concentrations than wild-type RecA, and thus had an enhanced capacity to displace a DNA binding protein. Kits are no more than a localized reagent or reagent (i.e. contained in a test tube). Tateishi et al disclose purification of the RecA5327 mutant (see Fig. 1 and page 116, second column, last ¶), a process which involves storing the purified or semi-purified proteins in tubes.

Claims 1, 2, 4, 5, 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Larminat et al (Mol. Gen. Genet., 1989).

Larminat et al disclose an *E. Coli* RecA (RecA335) protein with 17 residues removed form the C-terminus, see Fig. 1 and Summary. Absent evidence to the contrary, RecA335 is identical to SEQ ID NO: 1, the *E. Coli* RecA with 17 residues removed from the C-terminus (i.e.

335 residues in length, see the Sequence listing), termed ΔC17 by applicants. Applicants disclose that the ΔC17 mutant is able to displace SSB more efficiently than wild-type RecA (Fig. 7 of the specification). Thus, because they are the same protein, the RecA335 mutant of Larminat et al inherently had the property of enhancing the ability to displace SSB. Kits are no more than a localized reagent or reagent (i.e. contained in a test tube). Larminat et al disclose *E. Coli* strains expressing the RecA335 mutant used, inter alia, to supply proteins for a Western Blot (see Fig. 3 and page 107,¶ bridging first and second column), a process which involves using isolated *E. Coli,* comprising the RecA335 protein, in tubes.

Allowable Subject Matter

Claims 13, 15-21, 24-27 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael D. Burkhart whose telephone number is (571) 272-2915. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Nguyen can be reached on (571) 272-0731. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael D. Burkhart
Examiner
Art Unit 1633

Scott D. Priebe

SCOTT D. PRIEBE, PH.D
PRIMARY EXAMINER